QSM368ZP-WF&SG368Z 系列
Linux&Ubuntu&OpenWrt OTA 升级指导

智能产品

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文档历史

修订记录

版本	日期	作者	变更表述
-	2023-12-05	Rene LI	文档创建
1.0	2024-01-22	Rene LI	受控版本
1.1	2024-09-02	Nikola Golubović	1. 更新文档名，新增“OpenWrt”字样。 2. 新增 OpenWrt 系统说明（第 1 章）。
1.2	2025-12-17	Farr Tan	1. 添加 PDF 复制代码可能导致非预期换行的说明备注（第 1 章）。 2. 添加 OTA 升级包操作相关备注（第 1 章）。 3. 新增 Linux 6.1 版本 OTA 升级。
1.3	2026-01-10	Farr Tan	新增 OTA 升级应用场景及跨基线 OTA 升级说明（第 1 章）。

目录

1 引言

本文档主要介绍移远通信 QSM368ZP-WF 设备和 SG368Z 系列模块的 OTA（Over-the-Air）升级包的制作和升级过程。

OTA 升级工具为 Google Android OTA 发布工具，用户可进入以下地址了解详情。

- https://source.android.com/devices/tech/ota
- https://source.android.com/devices/tech/ota/tools

备注

1. 本文档适用于运行 Linux 操作系统的 QSM368ZP-WF 设备和运行 Linux 或 Ubuntu 操作系统的 SG368Z 系列模块。
2. SG368Z 系列模块本身无法预装 OpenWrt 系统，仅提供 SDK 及开发指导供客户二次开发。若有问题，请联系移远通信技术支持。
3. 请勿对 OTA 升级包进行内容修改、解压后重新压缩等操作，此类操作可能造成 OTA 升级失败；当前支持重命名 OTA 升级包。
4. 本文档所述 OTA 升级功能，适用于同一软件基线版本的升级场景。任何跨基线的 OTA 升级需求，请务必联系移远通信技术支持进行评估。
5. 由于 PDF 格式特性，文档中部分代码块可能因页面宽度限制自动换行。直接从 PDF 复制代码到编辑器时，可能引入非预期的换行符（\n），导致代码无法正常运行。
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   - 手动删除复制粘贴后代码中的多余换行符。
   - 或通过代码编辑器的替换功能批量删除多余换行符（注意保留语义换行）。

2 升级步骤

QSM368ZP-WF 设备和 SG368Z 系列模块仅支持整包 OTA 升级。

2.1. 生成用于创建升级包的文件

设备的整包 OTA 升级是指使用 OTA 软件包对设备的整个最终状态（包括 *system*、*boot* 和 *recovery* 分区）进行升级。

- Linux：

  整编命令 **build-all-image** 用于构建整包 OTA 升级包，如下所示：

```
qct@build:RK3568_Linux_R60_v1.3.2$source build-quec.sh
qct@build:RK3568_Linux_R60_v1.3.2$build-all-image
```

- Linux 6.1：

  整编命令 **build-all-image** 用于构建整包 OTA 升级包，如下所示：

```
qct@build:RK3568_Linux6.1_R62_rkr5$source build-quec.sh
qct@build:RK3568_Linux6.1_R62_rkr5$build-all-image
```

- Ubuntu：

  整编命令 **build-all-image-yocto** 用于构建整包 OTA 升级包，如下所示：

```
qct@build:RK3568_Linux_R60_v1.3.2$source build-quec.sh
qct@build:RK3568_Linux_R60_v1.3.2$build-all-image-yocto
```

- OpenWrt：

  整编命令 **build-all-image-openwrt** 用于构建整包 OTA 升级包，如下所示：

```
qct@build:RK3568_Linux_R61_v1.3.2$source build-quec.sh
qct@build:RK3568_Linux_R61_v1.3.2$build-all-image-openwrt
```

执行上述命令后，将在如下路径中生成 *update.img*，即整包 OTA 升级包：

- Linux 和 Ubuntu：

  ```
  RK3568_Linux_R60_v1.3.2/rockdev/update.img
  ```

- Linux 6.1：

  ```
  RK3568_Linux6.1_R62_rkr5/rockdev/update.img
  ```

- OpenWrt：

  ```
  RK3568_Linux_R61_v1.3.2/rockdev/update.img
  ```

2.2. 升级包结构

升级包结构如下：

```
# NAME       Relative path
#
#HWDEF           HWDEF
package-file  package-file
bootloader    Image/MiniLoaderAll.bin
parameter     Image/parameter.txt
#trust        Image/trust.img
uboot         Image/uboot.img
misc          Image/misc.img
#resource     Image/resource.img
#kernel       Image/kernel.img
boot          Image/boot.img
recovery      Image/recovery.img
persist       Image/persist.img
rootfs        Image/rootfs.img
oem           Image/oem.img
#userdata     Image/userdata.img-------
```

2.3. 整包 OTA 升级

执行如下命令进行整包 OTA 升级：

- Linux 和 Ubuntu：

```
adb push RK3568_Linux_R60_v1.3.2/rockdev/update.img    /userdata/
adb shell "update ota /userdata/update.img"
```

- Linux 6.1：

```
adb push  RK3568_Linux6.1_R62_rkr5/rockdev/update.img    /userdata/
adb shell "update ota /userdata/update.img"
```

- OpenWrt：

```
adb push RK3568_Linux_R61_v1.3.2/rockdev/update.img    /userdata/
adb shell "update ota /userdata/update.img"
```

当设备处于 recovery 模式时，升级 log 存储在*/userdata/recovery/log* 文件中，log 示例如下：

- Linux：

```
[  Recovery System have UI defined.
failed to read font: res=-1, fall back to the compiled-in font
rotate degree: 0 - none, 1 - right, 2 - down, 3 - left.
current rotate degree is : 0
recovery filesystem table
=========================
  0 (null) /tmp ramdisk (null) (null) (null)
  1 /dev/root / ext4 rw,noauto 0 1
  2 tmpfs /tmp tmpfs mode=1777 0 0
  3 tmpfs /run tmpfs mode=0755,nosuid,nodev 0 0
  4 proc /proc proc defaults 0 0
  5 devtmpfs /dev devtmpfs defaults 0 0
  6 devpts /dev/pts devpts mode=0620,ptmxmode=0666,gid=5 0 0
  7 tmpfs /dev/shm tmpfs nosuid,nodev,noexec 0 0
  8 sysfs /sys sysfs defaults 0 0
  9 configfs /sys/kernel/config configfs defaults 0 0
  10 debugfs /sys/kernel/debug debugfs defaults 0 0
  11 pstore /sys/fs/pstore pstore defaults 0 0
  12 /dev/sda1 /mnt/udisk auto defaults 0 2
  13 /dev/mmcblk1p1 /mnt/sdcard auto defaults 0 2
  14 /dev/block/by-name/oem /oem ext4 defaults 0 2
  15 /dev/block/by-name/persist /persist ext4 defaults 0 2
  16 /dev/block/by-name/userdata /userdata ext4 defaults 0 2
[I/]RECOVERY devices is not MTD.
emmc_point is /dev/mmcblk0
sd_point is (null)
sd_point_2 is (null)
```

```
read cmdline
>>> Boot from non-SDcard
[I/]RECOVERY devices is not MTD.
[I/]RECOVERY Boot command: boot-recovery
[I/]RECOVERY Got arguments from boot message
[I/]RECOVERY devices is not MTD.
[I/]RECOVERY devices is not MTD.
[I/]RECOVERY Boot command: boot-recovery
[I/]RECOVERY Boot recovery: recovery
--update_package=/userdata/update.img

[E/]RECOVERY pcba_mode  pcba_test:0
Command: "recovery" "--update_package=/userdata/update.img"

[E/]RECOVERY
 === umount userdata fail ===
>>>rkflash will update from /userdata/update.img
[I/]RECOVERY [do_rk_update] start with main.
librkupdate_Start to upgrade firmware...
RKBoot:this is new IDB flag
librkupdate_INFO:is emmc devices...
librkupdate_INFO:CRKUsbComm-->is emmc.
librkupdate_INFO:CRKUsbComm-->/dev/vendor_storage=22
librkupdate_INFO:CRKUsbComm-->/dev/mmcblk0=24
librkupdate_Get FlashInfo...
librkupdate_INFO: m_bEmmc = 1, m_hLbaDev = 24
librkupdate_INFO: lseek64 result = 31268536320
librkupdate_INFO:FlashInfo: 00 F0 D1 01 7F 00 00 00 C0 58 03
GetFlashInfo: 266  info.uiFlashSize = 30535680 total uiBlockNum = 61071360
GetFlashInfo: 267  FlashSize = 29820 MB
# NAME          Relative path
#
#HWDEF          HWDEF
package-file    package-file
bootloader      Image/MiniLoaderAll.bin
parameter       Image/parameter.txt
#trust          Image/trust.img
uboot           Image/uboot.img
misc            Image/misc.img
#resource       Image/resource.img
#kernel         Image/kernel.img
boot            Image/boot.img
recovery        Image/recovery.img
persist         Image/persist.img
```

```
rootfs          Image/rootfs.img
oem             Image/oem.img
userdata        Image/userdata.img
backup          RESERVED
#update-script  update-script
#recover-script recover-script
52 4b 35 68 2 0 fe 42 10 1 54 48 33 50 34 30
0 0 0 0 0 0 0 5 16 2 37 5a 7 f 0 0 ################ update bootloader start #############
librkupdate_IDBlock Preparing...
               ################ IDBlock Preparing...
librkupdate_INFO:CalcIDBCount IsNewIDBFlag is true
librkupdate_ERROR:PrepareIDB-->New IDblock offset=0 1 2 3 4 .
librkupdate_IDBlock Writing...
               ################ IDBlock Writing...
librkupdate_INFO:DownloadIDBlock-->IsNewIDBFlag is true
librkupdate_INFO:MakeNewIDBlockData in
librkupdate_INFO:MakeNewIDBlockData out
librkupdate_INFO:WriteIDBlock in
librkupdate_INFO:--------------------
librkupdate_dwSectorNum=584
librkupdate_uiTotal=299008

librkupdate_INFO:WriteIDBlock out
################ update bootloader Success#############
>>>>>>>> bGptFlag = 1, lineno = 1457
>>>>>>>> CRKAndroidDevice::bGptFlag = 1
librkupdate_############ RKA_Gpt_Download #########
librkupdate_INFO:###### Downloading uboot #######
librkupdate_INFO:Start updating [ uboot ],offset=0x4000,size=4194304
librkupdate_INFO:###### Download uboot Done #######
librkupdate_INFO:##  Ignore [ misc ] download  ##
librkupdate_INFO:###### Downloading boot #######
librkupdate_INFO:Start updating [ boot ],offset=0x8000,size=29144064
 >>>>>> parameter writing... <<<<<<
parameter writing... >>>>>> uboot writing... <<<<<<
uboot writing... >>>>>> boot writing... <<<<<<
boot writing...librkupdate_INFO:###### Download boot Done #######
librkupdate_INFO:##  Ignore [ recovery ] download  ##
librkupdate_INFO:###### Downloading persist #######
librkupdate_INFO:Start updating [ persist ],offset=0x48000,size=33554432
 >>>>>> persist writing... <<<<<<
persist writing...librkupdate_INFO:###### Download persist Done #######
librkupdate_INFO:###### Downloading rootfs #######
librkupdate_INFO:Start updating [ rootfs ],offset=0x72000,size=490471424
```

```
 >>>>>> rootfs writing... <<<<<<
rootfs writing...librkupdate_INFO:###### Download rootfs Done #######
librkupdate_INFO:###### Downloading oem #######
librkupdate_INFO:Start updating [ oem ],offset=0xc72000,size=17457152
 >>>>>> oem writing... <<<<<<
oem writing...librkupdate_INFO:###### Download oem Done #######
librkupdate_INFO:# Ignore [ misc ] Check #
librkupdate_INFO:# Ignore [ recovery ] Check #
 >>>>>> parameter checking... <<<<<<
parameter checking... >>>>>> uboot checking... <<<<<<
uboot checking...librkupdate_INFO:# Ignore [ userdata ] Check #
librkupdate_Finish to upgrade firmware.
 >>>>>> boot checking... <<<<<<
boot checking... >>>>>> persist checking... <<<<<<
persist checking... >>>>>> rootfs checking... <<<<<<
rootfs checking... >>>>>> oem checking... <<<<<<
oem checking...update.img Installation done.
finish_recovery Enter.....
```

- Linux 6.1：

```
************************************************************
          ROCKCHIP recovery system
************************************************************
**** version : V1.0.1-g<unknown> ****
LOG_INFO: Starting recovery on Sat Jan  1 00:10:58 2000

LOG_INFO: Recovery System have UI defined.
LOG_INFO: failed to read font: res=-1, fall back to the compiled-in font
LOG_INFO: rotate degree: 0 - none, 1 - right, 2 - down, 3 - left.
LOG_INFO: current rotate degree is : 0
recovery filesystem table
=========================
  0 (null) /tmp ramdisk (null) (null) (null)
  1 /dev/root / ext4 rw,noauto 0 1
  2 tmpfs /tmp tmpfs mode=1777 0 0
  3 tmpfs /run tmpfs mode=0755,nosuid,nodev 0 0
  4 tmpfs /var/log tmpfs mode=0755,nosuid,nodev 0 0
  5 proc /proc proc defaults 0 0
  6 devtmpfs /dev devtmpfs defaults 0 0
  7 devpts /dev/pts devpts mode=0620,ptmxmode=0000,gid=5 0 0
  8 tmpfs /dev/shm tmpfs nosuid,nodev,noexec 0 0
  9 sysfs /sys sysfs nosuid,nodev,noexec 0 0
  10 configfs /sys/kernel/config configfs defaults 0 0
  11 debugfs /sys/kernel/debug debugfs defaults 0 0
```

```
 12 pstore /sys/fs/pstore pstore nosuid,nodev,noexec 0 0
 13 /dev/sda1 /mnt/udisk auto defaults 0 2
 14 /dev/mmcblk1p1 /mnt/sdcard auto defaults 0 2
 15 /dev/block/by-name/oem /oem ext4 defaults 0 2
 16 /dev/block/by-name/persist /persist ext4 defaults 0 2
 17 /dev/block/by-name/userdata /userdata ext4 defaults 0 2

LOG_INFO: devices is not MTD.
LOG_INFO: emmc_point is /dev/mmcblk0
LOG_INFO: sd_point is (null)
LOG_INFO: sd_point_2 is (null)
LOG_INFO: read cmdline
LOG_INFO: >>> Boot from non-SDcard
LOG_INFO: read cmdline
LOG_INFO: >>> Boot from non-U-Disk
LOG_INFO: Command: "recovery" "--update_package=/userdata/update.img"

LOG_INFO: check userdata/oem partition success ...
LOG_INFO: mounted /userdata/update.img Success.
LOG_INFO: >>>rkflash will update from /userdata/update.img
LOG_INFO: [do_rk_update] start with main.
librkupdate_Start to upgrade firmware...
RKBoot:this is new IDB flag
librkupdate_INFO:is emmc devices...
CRKUsbComm INFO m_bEmmc=1 m_ufs=0
librkupdate_INFO:CRKUsbComm-->is emmc.
librkupdate_INFO:CRKUsbComm-->/dev/vendor_storage=23
librkupdate_INFO:CRKUsbComm-->/dev/mmcblk0=27
librkupdate_Get FlashInfo...
librkupdate_INFO: m_bEmmc = 1, m_hLbaDev = 27
librkupdate_INFO: lseek64 result = 31272730624
librkupdate_INFO:FlashInfo: 00 00 D2 01 7F 00 00 00 01 00 00
GetFlashInfo: 266  info.uiFlashSize = 30539776 total uiBlockNum = 61079552
GetFlashInfo: 267  FlashSize = 29824 MB
# NAME  PATH
package-file    package-file
parameter       parameter.txt
bootloader      MiniLoaderAll.bin
uboot   uboot.img
misc    misc.img
boot    boot.img
recovery        recovery.img
backup  RESERVED
rootfs  rootfs.img
```

```
oem     oem.img
userdata        userdata.img
52 4b 35 68 2 0 fe 42 18 1 4d 33 43 33 36 34
0 0 0 0 0 0 0 6 25 c 24 41 5 9 0 0 ################ update bootloader start#############
librkupdate_IDBlock Preparing...
                ################ IDBlock Preparing...
librkupdate_INFO:CalcIDBCount IsNewIDBFlag is true
librkupdate_ERROR:PrepareIDB-->New IDblock offset=0 1 2 3 4 .
librkupdate_IDBlock Writing...
                ################ IDBlock Writing...
librkupdate_INFO:DownloadIDBlock-->IsNewIDBFlag is true
librkupdate_INFO:MakeNewIDBlockData in
librkupdate_INFO:MakeNewIDBlockData out
librkupdate_INFO:WriteIDBlock in
librkupdate_INFO:----------------------
librkupdate_dwSectorNum=624
librkupdate_uiTotal=319488

RKU_IsUfs is_ufs = 0, is_emmc
RKU_IsUfs is_ufs = 0, is_emmc
RKU_IsUfs is_ufs = 0, is_emmc
RKU_IsUfs is_ufs = 0, is_emmc
RKU_IsUfs is_ufs = 0, is_emmc
librkupdate_INFO:WriteIDBlock out
################ update bootloader Success#############
>>>>>>>> bGptFlag = 1, lineno = 1487
>>>>>>>> CRKAndroidDevice::bGptFlag = 1
librkupdate_############ RKA_Gpt_Download #########
RKU_IsUfs is_ufs = 0, is_emmc
librkupdate_INFO:###### Downloading uboot #######
librkupdate_INFO:Start updating [ uboot ],offset=0x4000,size=4194304
librkupdate_INFO:###### Download uboot Done #######
librkupdate_INFO:##  Ignore [ misc ] download  ##
librkupdate_INFO:###### Downloading boot #######
librkupdate_INFO:Start updating [ boot ],offset=0x8000,size=41236992
LOG_INFO:  >>>>>> parameter writing... <<<<<<
librkupdate_INFO:###### Download boot Done #######
librkupdate_INFO:##  Ignore [ recovery ] download  ##
librkupdate_INFO:###### Downloading rootfs #######
librkupdate_INFO:Start updating [ rootfs ],offset=0x6c000,size=893386752
LOG_INFO:  >>>>>> uboot writing... <<<<<<
LOG_INFO:  >>>>>> boot writing... <<<<<<
LOG_INFO:  >>>>>> rootfs writing... <<<<<<
librkupdate_INFO:###### Download rootfs Done #######
```

```
librkupdate_INFO:###### Downloading oem #######
librkupdate_INFO:Start updating [ oem ],offset=0xc6c000,size=18804736
LOG_INFO:  >>>>>> oem writing... <<<<<<
librkupdate_INFO:###### Download oem Done #######
RKU_IsUfs is_ufs = 0, is_emmc
librkupdate_INFO:# Ignore [ misc ] Check #
librkupdate_INFO:# Ignore [ recovery ] Check #
LOG_INFO:  >>>>>> parameter checking... <<<<<<
LOG_INFO:  >>>>>> uboot checking... <<<<<<
LOG_INFO:  >>>>>> boot checking... <<<<<<
LOG_INFO:  >>>>>> rootfs checking... <<<<<<
librkupdate_INFO:# Ignore [ userdata ] Check #
librkupdate_Finish to upgrade firmware.
LOG_INFO:  >>>>>> oem checking... <<<<<<
LOG_INFO: finish_recovery Enter.....
```

- Ubuntu：

```
[  Recovery System have UI defined.
failed to read font: res=-1, fall back to the compiled-in font
rotate degree: 0 - none, 1 - right, 2 - down, 3 - left.
current rotate degree is : 0
recovery filesystem table
=========================
  0 (null) /tmp ramdisk (null) (null) (null)
  1 /dev/root / ext4 rw,noauto 0 1
  2 tmpfs /tmp tmpfs mode=1777 0 0
  3 tmpfs /run tmpfs mode=0755,nosuid,nodev 0 0
  4 proc /proc proc defaults 0 0
  5 devtmpfs /dev devtmpfs defaults 0 0
  6 devpts /dev/pts devpts mode=0620,ptmxmode=0666,gid=5 0 0
  7 tmpfs /dev/shm tmpfs nosuid,nodev,noexec 0 0
  8 sysfs /sys sysfs defaults 0 0
  9 configfs /sys/kernel/config configfs defaults 0 0
  10 debugfs /sys/kernel/debug debugfs defaults 0 0
  11 pstore /sys/fs/pstore pstore defaults 0 0
  12 /dev/sda1 /mnt/udisk auto defaults 0 2
  13 /dev/mmcblk1p1 /mnt/sdcard auto defaults 0 2
  14 /dev/disk/by-partlabel/oem /oem ext4 defaults 0 2
  15 /dev/disk/by-partlabel/persist /persist ext4 defaults 0 2
  16 /dev/disk/by-partlabel/userdata /userdata ext4 defaults 0 2
 [I/]RECOVERY devices is not MTD.
emmc_point is /dev/mmcblk0
sd_point is (null)
sd_point_2 is (null)
```

```
read cmdline
>>> Boot from non-SDcard
[I/]RECOVERY devices is not MTD.
[I/]RECOVERY Boot command: boot-recovery
[I/]RECOVERY Got arguments from boot message
[I/]RECOVERY devices is not MTD.
[I/]RECOVERY devices is not MTD.
[I/]RECOVERY Boot command: boot-recovery
[I/]RECOVERY Boot recovery: recovery
--update_package=/userdata/update.img

[E/]RECOVERY pcba_mode  pcba_test:0
Command: "recovery" "--update_package=/userdata/update.img"

[E/]RECOVERY
 === umount userdata fail ===
>>>rkflash will update from /userdata/update.img
[I/]RECOVERY [do_rk_update] start with main.
librkupdate_Start to upgrade firmware...
RKBoot:this is new IDB flag
librkupdate_INFO:is emmc devices...
librkupdate_INFO:CRKUsbComm-->is emmc.
librkupdate_INFO:CRKUsbComm-->/dev/vendor_storage=22
librkupdate_INFO:CRKUsbComm-->/dev/mmcblk0=24
librkupdate_Get FlashInfo...
librkupdate_INFO: m_bEmmc = 1, m_hLbaDev = 24
librkupdate_INFO: lseek64 result = 31268536320
librkupdate_INFO:FlashInfo: 00 F0 D1 01 7F 00 00 00 C0 58 03
GetFlashInfo: 266  info.uiFlashSize = 30535680 total uiBlockNum = 61071360
GetFlashInfo: 267  FlashSize = 29820 MB
# NAME          Relative path
#
#HWDEF          HWDEF
package-file    package-file
bootloader      Image/MiniLoaderAll.bin
parameter       Image/parameter.txt
#trust          Image/trust.img
uboot           Image/uboot.img
misc            Image/misc.img
#resource       Image/resource.img
#kernel         Image/kernel.img
boot            Image/boot.img
recovery        Image/recovery.img
persist         Image/persist.img
```

```
rootfs          Image/rootfs.img
oem             Image/oem.img
userdata        Image/userdata.img
backup          RESERVED
#update-script  update-script
#recover-script recover-script
52 4b 35 68 2 0 fe 42 10 1 54 48 33 50 34 30
0 0 0 0 0 0 0 5 16 2 37 5a 7 f 0 0 ################ update bootloader start #############
librkupdate_IDBlock Preparing...
               ################ IDBlock Preparing...
librkupdate_INFO:CalcIDBCount IsNewIDBFlag is true
librkupdate_ERROR:PrepareIDB-->New IDblock offset=0 1 2 3 4 .
librkupdate_IDBlock Writing...
               ################ IDBlock Writing...
librkupdate_INFO:DownloadIDBlock-->IsNewIDBFlag is true
librkupdate_INFO:MakeNewIDBlockData in
librkupdate_INFO:MakeNewIDBlockData out
librkupdate_INFO:WriteIDBlock in
librkupdate_INFO:--------------------
librkupdate_dwSectorNum=584
librkupdate_uiTotal=299008

librkupdate_INFO:WriteIDBlock out
################ update bootloader Success#############
>>>>>>>> bGptFlag = 1, lineno = 1457
>>>>>>>> CRKAndroidDevice::bGptFlag = 1
librkupdate_############ RKA_Gpt_Download #########
librkupdate_INFO:###### Downloading uboot #######
librkupdate_INFO:Start updating [ uboot ],offset=0x4000,size=4194304
librkupdate_INFO:###### Download uboot Done #######
librkupdate_INFO:##  Ignore [ misc ] download  ##
librkupdate_INFO:###### Downloading boot #######
librkupdate_INFO:Start updating [ boot ],offset=0x8000,size=29144064
 >>>>>> parameter writing... <<<<<<
parameter writing... >>>>>> uboot writing... <<<<<<
uboot writing... >>>>>> boot writing... <<<<<<
boot writing...librkupdate_INFO:###### Download boot Done #######
librkupdate_INFO:##  Ignore [ recovery ] download  ##
librkupdate_INFO:###### Downloading persist #######
librkupdate_INFO:Start updating [ persist ],offset=0x48000,size=33554432
 >>>>>> persist writing... <<<<<<
persist writing...librkupdate_INFO:###### Download persist Done #######
librkupdate_INFO:###### Downloading rootfs #######
librkupdate_INFO:Start updating [ rootfs ],offset=0x72000,size=490471424
```

```
 >>>>>> rootfs writing... <<<<<<
rootfs writing...librkupdate_INFO:###### Download rootfs Done #######
librkupdate_INFO:###### Downloading oem #######
librkupdate_INFO:Start updating [ oem ],offset=0xc72000,size=17457152
 >>>>>> oem writing... <<<<<<
oem writing...librkupdate_INFO:###### Download oem Done #######
librkupdate_INFO:# Ignore [ misc ] Check #
librkupdate_INFO:# Ignore [ recovery ] Check #
 >>>>>> parameter checking... <<<<<<
parameter checking... >>>>>> uboot checking... <<<<<<
uboot checking...librkupdate_INFO:# Ignore [ userdata ] Check #
librkupdate_Finish to upgrade firmware.
 >>>>>> boot checking... <<<<<<
boot checking... >>>>>> persist checking... <<<<<<
persist checking... >>>>>> rootfs checking... <<<<<<
rootfs checking... >>>>>> oem checking... <<<<<<
oem checking...update.img Installation done.
finish_recovery Enter.....
```

- OpenWrt：

```
LOG_INFO: Recovery System have UI defined.
LOG_INFO: failed to read font: res=-1, fall back to the compiled-in font
cannot find/open a drm device: No such file or directory
recovery filesystem table
=========================
  0 (null) /tmp ramdisk (null) (null) (null)
  1 /dev/root / ext4 rw,noauto 0 1
  2 tmpfs /tmp tmpfs mode=1777 0 0
  3 tmpfs /run tmpfs mode=0755,nosuid,nodev 0 0
  4 tmpfs /var/log tmpfs mode=0755,nosuid,nodev 0 0
  5 proc /proc proc defaults 0 0
  6 devtmpfs /dev devtmpfs defaults 0 0
  7 devpts /dev/pts devpts mode=0620,ptmxmode=0000,gid=5 0 0
  8 tmpfs /dev/shm tmpfs nosuid,nodev,noexec 0 0
  9 sysfs /sys sysfs nosuid,nodev,noexec 0 0
  10 configfs /sys/kernel/config configfs defaults 0 0
  11 debugfs /sys/kernel/debug debugfs defaults 0 0
  12 pstore /sys/fs/pstore pstore nosuid,nodev,noexec 0 0
  13 /dev/sda1 /mnt/udisk auto defaults 0 2
  14 /dev/mmcblk1p1 /mnt/sdcard auto defaults 0 2
  15 /dev/block/by-name/oem /oem ext4 defaults 0 2
  16 /dev/block/by-name/persist /persist ext4 defaults 0 2
  17 /dev/block/by-name/userdata /userdata ext4 defaults 0 2
```

```
LOG_INFO: devices is not MTD.
LOG_INFO: emmc_point is /dev/mmcblk0
LOG_INFO: sd_point is (null)
LOG_INFO: sd_point_2 is (null)
LOG_INFO: read cmdline
LOG_INFO: >>> Boot from non-SDcard
LOG_INFO: read cmdline
LOG_INFO: >>> Boot from non-U-Disk
LOG_INFO: Command: "recovery" "--update_package=/userdata/update.img"

LOG_INFO: check userdata/oem partition success ...
LOG_INFO: mounted /userdata/update.img Success.
LOG_INFO: >>>rkflash will update from /userdata/update.img
LOG_INFO: [do_rk_update] start with main.
librkupdate_Start to upgrade firmware...
RKBoot:this is new IDB flag
librkupdate_INFO:is emmc devices...
librkupdate_INFO:CRKUsbComm-->is emmc.
librkupdate_INFO:CRKUsbComm-->/dev/vendor_storage=8
librkupdate_INFO:CRKUsbComm-->/dev/mmcblk0=9
librkupdate_Get FlashInfo...
librkupdate_INFO: m_bEmmc = 1, m_hLbaDev = 9
librkupdate_INFO: lseek64 result = 31268536320
librkupdate_INFO:FlashInfo: 00 F0 D1 01 7F 00 00 00 F0 34 4C
GetFlashInfo: 266  info.uiFlashSize = 30535680 total uiBlockNum = 61071360
GetFlashInfo: 267  FlashSize = 29820 MB
# NAME PATH
package-file  package-file
parameter     parameter.txt
bootloader    MiniLoaderAll.bin
uboot     uboot.img
misc      misc.img
bootboot.img
recovery recovery.img
persist    persist.img
nvdata1  nvdata1.img
nvdata2  nvdata2.img
backup   RESERVED
rootfs     rootfs.img
oemoem.img
userdatauserdata.img
52 4b 35 68 2 0 fe 42 10 1 54 48 53 52 32 38
0 0 0 0 0 0 0 d 12 6 25 43 6 a 0 0 ################ update bootloader start #############
librkupdate_IDBlock Preparing...
```

```
            ################ IDBlock Preparing...
librkupdate_INFO:CalcIDBCount IsNewIDBFlag is true
librkupdate_ERROR:PrepareIDB-->New IDblock offset=0 1 2 3 4 .
librkupdate_IDBlock Writing...
            ################ IDBlock Writing...
librkupdate_INFO:DownloadIDBlock-->IsNewIDBFlag is true
librkupdate_INFO:MakeNewIDBlockData in
librkupdate_INFO:MakeNewIDBlockData out
librkupdate_INFO:WriteIDBlock in
librkupdate_INFO:----------------------
librkupdate_dwSectorNum=612
librkupdate_uiTotal=313344

librkupdate_INFO:WriteIDBlock out
################ update bootloader Success#############
>>>>>>>> bGptFlag = 1, lineno = 1455
>>>>>>>> CRKAndroidDevice::bGptFlag = 1
librkupdate_############ RKA_Gpt_Download #########
LOG_INFO:  >>>>>> parameter writing... <<<<<<
librkupdate_INFO:###### Downloading uboot #######
librkupdate_INFO:Start updating [ uboot ],offset=0x4000,size=4194304
LOG_INFO:  >>>>>> uboot writing... <<<<<<
librkupdate_INFO:###### Download uboot Done #######
librkupdate_INFO:##  Ignore [ misc ] download  ##
librkupdate_INFO:###### Downloading boot #######
librkupdate_INFO:Start updating [ boot ],offset=0x8000,size=38424064
LOG_INFO:  >>>>>> boot writing... <<<<<<
librkupdate_INFO:###### Download boot Done #######
librkupdate_INFO:##  Ignore [ recovery ] download  ##
librkupdate_INFO:###### Downloading persist #######
librkupdate_INFO:Start updating [ persist ],offset=0x48000,size=4206592
LOG_INFO:  >>>>>> persist writing... <<<<<<
librkupdate_INFO:###### Download persist Done #######
librkupdate_INFO:###### Downloading nvdata1 #######
librkupdate_INFO:Start updating [ nvdata1 ],offset=0x58000,size=49152
LOG_INFO:  >>>>>> nvdata1 writing... <<<<<<
librkupdate_INFO:###### Download nvdata1 Done #######
librkupdate_INFO:###### Downloading nvdata2 #######
librkupdate_INFO:Start updating [ nvdata2 ],offset=0x5a000,size=49152
LOG_INFO:  >>>>>> nvdata2 writing... <<<<<<
librkupdate_INFO:###### Download nvdata2 Done #######
librkupdate_INFO:###### Downloading rootfs #######
librkupdate_INFO:Start updating [ rootfs ],offset=0x6c000,size=109051904
LOG_INFO:  >>>>>> rootfs writing... <<<<<<
```

```
librkupdate_INFO:###### Download rootfs Done #######
librkupdate_INFO:###### Downloading oem ########
librkupdate_INFO:Start updating [ oem ],offset=0xc6c000,size=21651456
LOG_INFO:  >>>>>> oem writing... <<<<<<
librkupdate_INFO:###### Download oem Done #######
LOG_INFO:  >>>>>> parameter checking... <<<<<<
LOG_INFO:  >>>>>> uboot checking... <<<<<<
librkupdate_INFO:# Ignore [ misc ] Check #
LOG_INFO:  >>>>>> boot checking... <<<<<<
librkupdate_INFO:# Ignore [ recovery ] Check #
LOG_INFO:  >>>>>> persist checking... <<<<<<
LOG_INFO:  >>>>>> nvdata1 checking... <<<<<<
LOG_INFO:  >>>>>> nvdata2 checking... <<<<<<
LOG_INFO:  >>>>>> rootfs checking... <<<<<<
LOG_INFO:  >>>>>> oem checking... <<<<<<
librkupdate_INFO:# Ignore [ userdata ] Check #
librkupdate_Finish to upgrade firmware.
LOG_INFO: finish_recovery Enter.....
```

升级完成后，重启设备，OTA log 存放在*/userdata/recovery* 文件夹中，如下所示：

```
root@rockchip:/userdata/recovery# ls -la
total 24
drwxr-xr-x 2 root root 4096 Jan  1 00:01 .
drwxr-xr-x 7 root root 4096 Jan  1 00:00 ..
-rw-r----- 1 root root 5690 Jan  1 00:01 last_log
-rw-r--r-- 1 root root 6202 Jan  1 00:01 log
root@rockchip:/userdata/recovery#
```

3 验证整包 OTA 升级

可通过如下方式验证 *update.img* 是否升级成功。

执行如下命令，若发现内核构建时间更改，则表示升级成功：

```
root@rockchip:/# uname -a
Linux rockchip 4.19.232-ab203 #1 SMP Thu Apr 27 18:10:46 +03 2023 aarch64 GNU/Linux
```

通过如下方式验证 *modem* 是否升级成功：

```
Please input AT command(-1: exit):ati
AT command response[46]:
Quectel
RK3568
Revision: SG368ZWFNAR60A04

OK
```